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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,370	09/30/2003	Xiaowei Yao	30320/15636	5196

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EXAMINER

MALSAWMA, LALRINFAMKIM HMAR

ART UNIT PAPER NUMBER

2823

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/674,370

Applicant(s)

YAO ET AL.

Examiner

Lex Malsawma

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 22 and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by **Baba** (5,751,063).

Regarding claims 22 and 27:

Baba discloses (in Fig. 6) a circuit package comprising:

a substrate 7 having a plurality of pins 17, a top surface (i.e., the surface on which pins “17” are located), a bottom surface, a first via (at least for electric component “8”), a second via (at least for electronic component “9”, and an opening comprising a first perimeter edge (Col. 6, lines 37-45 and 63-64); and

a single heat sink 14 having a top surface, a bottom surface, a body having the same size as the opening, and a flange extending outwardly from the body having a second perimeter edge larger than the first perimeter edge, wherein the heat sink 14 is positioned within the opening such that the top surface is exposed through the top surface of the substrate and the bottom surface is exposed through the bottom surface of the substrate (i.e., note that Fig. 6 is view

upside down in order to properly reference “the top surface” and “the bottom surface” as recited in the current claims).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Baba** (5,751,063) in view of **Hamburgen** (5,235,211).

Regarding claim 30:

Baba anticipates the method of claim 22 but **lacks** the heat sink being specifically formed of a copper tungsten alloy. However, note that Baba specifies that the metal 14 is “formed of copper, etc.” (Col. 6, line 63). Hamburgen is **cited only** to show it was very well known in the

art that forming a heat sink with either copper or a copper-tungsten alloy is just a matter of choosing a well-known suitable material (note Col. 2, lines 31-34). Therefore, it would have been obvious to one of ordinary skill in the art to modify Baba by specifically using a copper-tungsten alloy instead of copper because Hamburg shows that either one of the materials is well-suited for heat sinks and the choice would essentially be a matter of preference for a particular design goal.

6. Claims 16, 17, 21 and 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Baba** (5,751,063) in view of Lee et al. (US 2002/0140085 A1; hereinafter “**Lee**”).

Regarding claim 23:

Initially, this claim is similar to claim 22/27 (anticipated by Baba) except that additional limitations for a first and second metal patterns are included. In addition to the limitations found in claim 22 (or 27), Baba discloses the substrate 7 (Fig. 6) comprises a wiring pattern mutually connected to solder balls 10, electrode pads of individual components, and external leads. In other words, it is implicit from Baba’s disclosure that a first metal pattern would be disposed on the top surface and electrically coupled to the first via; and a second metal pattern would be disposed on the bottom surface and electrically coupled to the second via. Baba implies such metal patterns because there are devices positioned on both surfaces (top and bottom).

Baba **lacks** specifically disclosing that a second metal pattern on the bottom surface would be electrically isolated from a first metal pattern located on the top surface of the substrate.

Lee is **cited only to show** that when metal patterns are formed on both surfaces of a substrate, it is typical/necessary to isolate some metal patterns on a top surface from metal patterns on the bottom surface. For example, Lee discloses (in Fig. 3A) a first metal pattern 312a disposed on a top surface of a substrate 311 and electrically coupled to a first via 313; and a second metal pattern (e.g., any of the center metal patterns located on the bottom surface of the substrate 311) electrically coupled to a second via (e.g., any of the vias in the thin portion of the substrate 311), the second metal pattern being electrically isolated from the first metal pattern.

Although Baba does not specifically provide details for metal patterns on the top and bottom surfaces of the substrate, Lee shows that some metal patterns on one side of a substrate are typically (and necessarily) electrically isolated from metal patterns on the opposite side of the substrate, i.e., electrical isolation between some of the metal patterns is required, otherwise the all leads for the device would be shorted. Therefore, it would have been obvious to one of ordinary skill in the art to modify Baba by specifically recited that the second metal pattern (on the bottom) is electrically isolated from the first metal pattern (on the top of the substrate) because Lee at very least shows that such an arrangement is typical and necessary to acquire a functional device.

Regarding claims 16, 17 and 21:

These claims are similar to claims 22, 27 and 23 with the exception being that claim 16 includes a limitation for a third metal pattern, which is coupled to the first metal pattern through the second via. As detail above (with respect to claim 23), Lee was cited to show that metal patterns on both top and bottom surfaces of a substrate would be formed such that a plurality of metal patterns on either side of the substrate will be isolated from each other, while a plurality of

metal patterns on one side of the substrate will be electrically coupled to a plurality of metal patterns on the opposite side of the substrate, wherein the coupling is provided through a plurality of vias. For example, Lee discloses (in Fig. 3A) that a first metal pattern 312a is electrically coupled to a third metal pattern 312b through a second via 313; and a second metal pattern (e.g., any of the center metal patterns located on the bottom surface of the substrate 311) electrically coupled to a first via (any of the vias in the thin portion of the substrate 311). As stated above, Baba does not specifically provide details for metal patterns on the top and bottom surfaces of the substrate; however, in view of Lee, it would have been obvious to one of ordinary skill in the art to modify Baba by specifically recited metal patterns as in current claim 16 because Lee at very least shows that such an arrangement is typical and necessary to acquire a functional device.

7. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Baba** (in view of **Lee**) as applied to claim 23 above, and further in view of Taguchi et al. (4,464,420; hereinafter "**Taguchi**").

Regarding claims 24-26:

Baba (in view of Lee) **lacks** specifically disclosing materials for the metal patterns, i.e., Baba lacks a first plated pattern electrolytically disposed on the first metal pattern; and a second plated pattern electrolytically disposed on the second metal pattern. Taguchi is **cited to show** it was well known in the art to plate gold and nickel on metal patterns located on a ceramic substrate (note Baba utilizes a ceramic substrate 7). Note in Fig. 4, Taguchi discloses nickel 4 and gold 5 are plated on metal patterns 2D (Col. 4, lines 18-25). Since Baba (in view of Lee)

does not provide details for forming the metal patterns, it would have been obvious to one of ordinary skill in the art to modify Baba (in view of Lee) by plating gold and/or nickel on the metal patterns because Taguchi shows that such a plating process were well known in the art for forming metallization on a ceramic substrate. Note that incorporating Taguchi into Baba (in view of Lee) would result in a gold plated first pattern and a second plated pattern comprising at least a nickel plated pattern (see metal patterns on both sides of the ceramic substrate 3 in Fig. 7).

8. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Baba** (5,751,063) in view of Nishi et al. (5,900,673; hereinafter “**Nishi**”).

Regarding claims 28 and 29:

Initially, these claims are similar to claim 22/27 (anticipated by Baba) with the only exception being that these claims require the heat sink to be brazed with a braze alloy comprising copper-silver braze alloy. Baba **lacks** brazing the heat sink to the substrate, since Baba bonds the heat sink using an adhesive (silicon resin, note Col. 6, lines 65-66 and Col. 7, lines 3-5). Nishi **teaches** it was well known and common in the art to use a copper-silver braze alloy to attach a heat sink to a substrate (note Col. 1, lines 47-51). Since Baba disclose the claimed invention except for specifically using a different attaching material (a braze alloy) and Nishi shows that the claimed material (copper-silver braze alloy) was commonly used for attaching a heat sink to a substrate, it would have been obvious to one of ordinary skill in the art to modify Baba by specifically using copper-silver braze alloy (instead of the adhesive) because the modification would be an obvious matter of selecting a known material on the basis of its suitability. Note that it has been held to be within the general skill of a worker in the art to select a known

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material on the basis of its suitability for the intended as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. Lastly, brazing the heat sink to the substrate would obviously provide a hermetic seal because the “brazed joint” would be similar to a soldered or welded joint.

9. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Baba** (in view of **Lee**) as applied to claim 16 above, and further in view of **Nishi** (5,900,673).

Regarding claims 18 and 19:

These claims are similar to claims 18 and 19; accordingly, they are held obvious over the cited references with reasoning similar to that applied to claims 18 and 19 above.

10. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Baba** (in view of **Lee**) as applied to claim 16 above, and further in view of **Hamburgen** (5,235,211).

Regarding claim 20:

This claim is similar to claim 30; accordingly, it is held obvious over the cited references with reasoning similar to that applied to claim 30 above.

11. Claims 10-15, 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Baba** (5,751,063) in view of **Lee** (US 2002/0140085 A1) and **Taguchi** (4,464,420).

Regarding claims 10-13:

These claims are similar to claims 16 and 23-26 (addressed in detail above), accordingly, they are held obvious over the cited references with reasoning similar to those applied above to

claims 16 and 24-26. Note that both Baba and Taguchi disclose using ceramic substrates and the ceramic would include alumina (Baba, Col. 1, lines 60-63; and the abstract in Taguchi).

Regarding claims 14, 15, 31 and 32:

These claims are similar to claims 16 and 24-26, accordingly, they are held obvious over the cited references with reasoning similar to those applied above to claims 16 and 24-26. In general, Baba discloses (in Fig. 6) a ceramic base portion 7 having a first surface, a second surface, a first via, a second via and a plurality of pins 17. However, Baba lacks specifying details for metal patterns formed on both surfaces (first and second) of the ceramic base portion. Lee is cited to show the metal patterns form on both sides of a substrate would typically include first, second, and third metal patterns having a layout as recited in the current claims. Baba (in view of Lee) **lacks** specifically disclosing materials for the metal patterns; accordingly, Taguchi is cited to show well-known materials commonly used when forming metal patterns on a ceramic substrate, wherein Taguchi specifically discloses the metal patterns commonly include plated nickel and plated gold on both surfaces of a ceramic substrate 3 (note Fig. 7), i.e., since Taguchi discloses using both plated-nickel and plated-gold for the metal patterns, the limitations in each of claims 14 and 15 held obvious over the cited references.

Remarks

12. Applicant's remarks/arguments have been fully considered and they are generally persuasive. However, new references have cited and in light of the newly cited references, all pending claims currently stand rejected under 35 USC § 102 and/or 35 USC § 103. Furthermore, in light of the newly discovered references, the subject matter previously indicated as being allowable is/are considered to be rendered obvious by the combination of references applied in

this Office action. This Office action is made NON-FINAL because the new grounds of rejection presented above were not necessitated by the amendment to the claims, filed on March 14, 2005.

Conclusion


13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.


The references listed on the attached Form PTO-892 (not cited above) are cited to show structures incorporating heat-sinks extending through substrates, electroplated metal patterns, metal patterns on both sides of a substrate, etc.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lex Malsawma whose telephone number is 571-272-1903.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lex Malsawma 
May 27, 2005


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